

CYTOPLASMIC ORGANELLES

STUDY GUIDE

Chapter
5

SECTION REVIEW

Organelles are tiny structures found inside the cytoplasm of the cell. Each type of organelle performs a specialized function that helps maintain a cell's life. In this section you learned about many important organelles.

Mitochondria enable organisms to use the chemical energy stored in food. Chloroplasts trap the energy of sunlight and convert it into chemical energy. Ribosomes are the sites at which the cell makes proteins. The endoplas-

mic reticulum transports materials throughout the inside of the cell. The Golgi apparatus modifies, collects, packages, and distributes cell products. Lysosomes contain enzymes that are used to digest food particles, foreign materials, and even cells or organelles that are damaged or have outlived their usefulness. Vacuoles and plastids store materials. And the cytoskeleton supports cell structure and drives cell movement.

Recognizing Function: Building Vocabulary Skills

From the following word bank, select the term that best fits each description. In the space provided, write the term you have selected. *Note:* Some terms may be used more than once. Some may not be used at all.

Word Bank		
Centriole	Golgi apparatus	Plastid
Chloroplast	Lysosome	Ribosome
Cilium	Microfilament	Rough ER
Cytoskeleton	Microtubule	Smooth ER
Endoplasmic reticulum (ER)	Mitochondrion	Vacuole
Flagellum	Organelle	

- Any tiny structure that performs a specialized function in the cell _____
- A plant organelle that may store starch or pigments _____
- Converts the chemical energy in food into a form that is more easily used _____
- Transport channels that are studded with ribosomes _____
- Modifies, collects, packages, and distributes proteins that are produced by the cell _____
- Saclike storage structure found in both animal and plant cells _____
- Short threadlike structure that helps a unicellular organism move _____
- Traps energy from sunlight and converts it to chemical energy _____
- Contains digestive enzymes that help clean up the cell _____
- Framework of filaments and fibers involved in cell support and movement _____

11. An organelle that serves as a protein factory _____
12. Tiny hollow tube made of proteins that is involved with support, the movement of organelles within the cell, and the formation of centrioles _____
13. Long, thin fiber that functions in the movement and support of the cell _____
14. A complex network of channels that is involved with transport, storage, and making and modifying proteins _____
15. Found only in plant and algae cells, it consists of two envelopelike membranes that surround a folded inner membrane _____

Making Comparisons: Using the Main Ideas

1. How are mitochondria and chloroplasts similar? _____

How are they different? _____

2. How are lysosomes, vacuoles, and plastids similar? _____

How are they different? _____

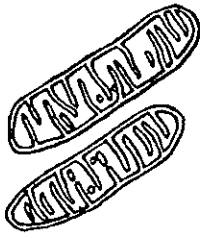
Applying Concepts: Building Vocabulary Skills

cytoplasm

The material in the cell outside the nucleus is called the *cytoplasm*. Although it contains thousands of substances, it consists mainly of water. Within the cytoplasm are the various organelles of the cell. The cytoplasm provides the environment in which the organelles carry on the life processes of the cell.

Questions

1. What is the main function of the cytoplasm?
2. The cytoplasm consists mainly of _____.

mitochondria

Mitochondria are slipper-shaped organelles found in the cytoplasm. They are enclosed by a double membrane, whose inner layer is highly folded so that it has a large surface area. Most stages of cell respiration occur in the mitochondria. The energy released during respiration is stored in the form of high-energy chemical bonds in molecules of ATP.

Questions

1. What is the function of mitochondria?
2. In what substance is the energy released during cell respiration stored? _____
3. What is the advantage of the folding of the inner membrane of the mitochondrion?

ribosomes

Ribosomes are small, dense granules found free in the cytoplasm and the nucleus and lining the membranes of some endoplasmic reticulum. Ribosomes are composed mainly of RNA. They are the centers of protein synthesis in the cell.

Questions

1. Where are ribosomes located in the cell?
2. What is the function of ribosomes?
3. What happens to amino acids at the ribosomes?

endoplasmic reticulum

The *endoplasmic reticulum* is a membrane-bounded system of channels or tubes through which materials are transported within the cell. The membranes of the endoplasmic reticulum may also serve as sites of biochemical reactions. There are two types of endoplasmic reticulum—smooth and rough. The rough, or granular, appearance of some endoplasmic reticulum is due to the presence of ribosomes on the endoplasmic reticulum membranes. Rough endoplasmic reticulum is found mainly in cells involved in protein synthesis. Smooth endoplasmic reticulum, which has no ribosomes on its membranes, is found mainly in cells involved in synthesis of nonprotein substances.

Questions

1. What are the functions of the endoplasmic reticulum?
2. The two types of endoplasmic reticulum are _____ and _____.
3. In what types of cells are each found?

Golgi bodies

The *Golgi body* is made up of a series of membrane-enclosed sacs, and it is usually found near the nucleus. This organelle is associated with the production of lysosomes and with the synthesis of various secretions.

Questions

1. What are the functions of the Golgi body?
2. Where is the Golgi body generally located in the cell?

lysosomes

Lysosomes are "packages," or sacs, of digestive enzymes. They keep the enzymes separated from the rest of the cell contents until they are needed. Lysosomes, which are found only in animal cells, are egg-shaped structures enclosed by a membrane.

Questions

1. What is the function of lysosomes?
2. Where in the cell are lysosomes produced?

vacuoles

Vacuoles are membrane-enclosed structures that are generally filled with water containing various dissolved substances. Vacuoles in animal cells are usually small. Large vacuoles are often present in protists and in plant cells. In the protists there are food vacuoles in which food is digested so that it can be used by the cell. In some fresh-water protozoa there are water vacuoles that remove excess water from the cell and discharge it back into the environment. Much of the inside of a typical green plant cell is filled with a large vacuole. The pressure created by the vacuole helps to maintain the rigid structure of the cell and of the plant.

Questions

1. In protozoans such as the ameba digestion occurs within _____.
2. How is excess water removed from fresh-water protozoa?
3. What is the function of the large vacuole present in the cells of green plants?

centrosomes

Centrosomes are small organelles found just outside the nucleus in animal cells. Within the centrosome are two small structures called *centrioles*, which are necessary for the movement of chromosomes during cell division. Centrioles are also associated with the formation of cilia and flagella in a wide variety of cell types.

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Questions

1. Centrosomes are found only in the cells of _____.
2. What are the functions of centrioles?

cell walls

Cell walls are structures found just outside the cell membrane in plant cells. The cell wall is considered to be a "nonliving" part of the cell, since it does not take part in any of the life functions of the cell. The cell wall is made up chiefly of cellulose, is relatively rigid, and provides support for the cell.

Questions

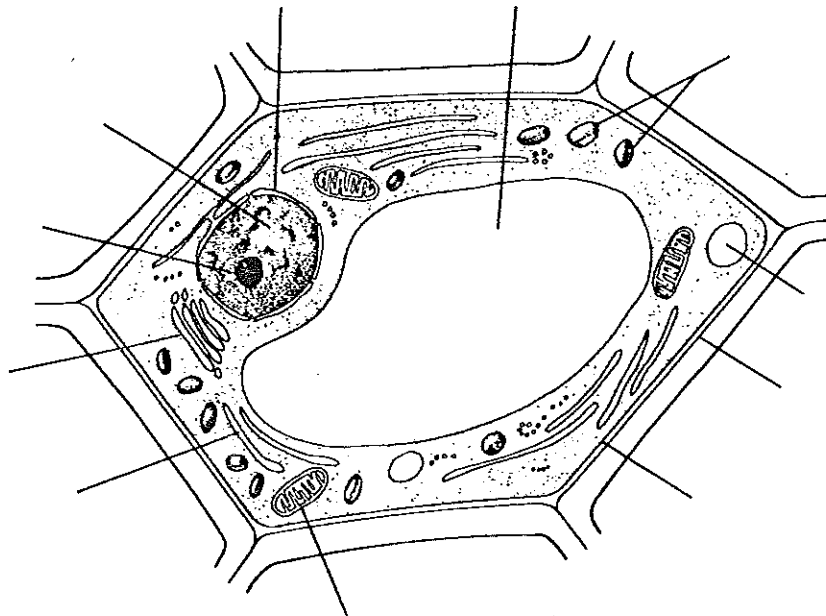
1. What are the functions of the cell wall?
2. What are cell walls composed of?

chloroplasts

Chloroplasts, found only in plant cells and in some protists, contain the green pigment *chlorophyll*, which carries on the process of photosynthesis. In photosynthesis, light energy is used for the manufacture of food.

Questions

1. The source of energy for photosynthesis is _____.
2. The most important pigment in chloroplasts is _____.
3. Label the parts indicated in the drawing below of a generalized plant cell.



4. What are three structural differences between a typical animal cell and a typical green plant cell?

REVIEW EXERCISES: UNIT 1

A. Using the vocabulary terms in the following list, fill in the blanks in the statements below.

cell membrane

cellulose

cell wall

centrosomes

chlorophyll

chloroplasts

chromosomes

cytoplasm

endoplasmic reticulum

gel

Golgi body

lysosomes

mitochondria

nucleolus

nucleus

ribosomes

sol

vacuole

- Most steps in the process of cell respiration take place within cytoplasmic organelles called _____.
- Sacs of digestive enzymes found only in the cytoplasm of animal cells are called _____.
- In animal cells centrioles are found within _____.
- The relatively rigid structure that supports and gives shape to the plant cell is the _____, which is made of _____.
- In plant cells, the green pigment _____ is found within _____.
- The cytoplasmic organelles involved in protein synthesis are the _____.
- The site of RNA synthesis within the nucleus is the _____.
- The material that fills the area between the nucleus and the cell membrane is the _____.
- The membrane-bounded system of channels through which materials are transported within the cell is the _____.
- The organelle consisting of a series of membrane-enclosed sacs usually found near the nucleus is the _____.
- The inside of a green plant cell may be almost completely filled with a large _____.
- The control center of the cell is the _____.
- The passage of materials into and out of the cell is controlled by the _____.
- Hereditary information is contained in the _____ in the nucleus.
- The cytoplasm can change from a watery _____ phase to a more viscous _____ phase.

B. In the answer space for each question, write the letter of the choice that best completes the statement.

- _____ 1. Cell membranes are (a) semipermeable (b) impermeable (c) permeable (d) non-permeable
- _____ 2. Transport in mammals involves absorption and (a) circulation (b) adsorption (c) transpiration (d) assimilation
- _____ 3. Which organelle is associated with a process of synthesis? (a) ribosome (b) mitochondria (c) cell membrane (d) vacuole
- _____ 4. The organelle that controls the passage of material into and out of the cell is the (a) chloroplast (b) nucleus (c) cytoplasm (d) cell membrane
- _____ 5. The cell wall is composed of (a) glycogen (b) proteins (c) cellulose (d) fatty acids
- _____ 6. Lysosomes contain (a) glycogen (b) digestive enzymes (c) hormones (d) fats
- _____ 7. Lysosomes are found (a) only in protozoa (b) only in animal cells (c) only in plant cells (d) only in brown algae
- _____ 8. The nucleolus is the site of (a) DNA synthesis (b) RNA synthesis (c) glucose breakdown (d) glycogen synthesis
- _____ 9. The chromatin network is found in the (a) cytoplasm (b) nucleus (c) endoplasmic reticulum (d) centrosomes
- _____ 10. The nuclear membrane is (a) semipermeable (b) impermeable (c) permeable (d) nonpermeable

C. In the spaces to the right of each definition, write the name of the life process defined and the number of the proper example.

Definition	Life Process	Example No.	Examples
A. The removal of metabolic wastes			1. The synthesis of glycogen from glucose.
B. The process that occurs by an increase in cell size or cell number.			2. Glucose in the intestine reaches a muscle cell.
C. The production of complex substances from simpler ones.			3. The breakdown of proteins into simple amino acids.
D. The absorption and distribution of substances within an organism.			4. The exhaling of carbon dioxide and water vapor.
E. The production of new organisms that are essentially the same as their parents.			5. Body temperature is maintained at 37°C regardless of outside temperature.
F. The release of energy in an organism as a result of the oxidation of food materials.			6. A child grows 4 centimeters in a year.
G. Maintenance of a constant internal environment.			7. The deer population of an area doubles over a period of time.
H. Changing food materials from the environment into a usable form.			8. Glucose is converted into carbon dioxide and water.